soniKKs
ULTRASONICS TECHNOLOGY

User Guide
Display and firmware
soniKKs Switchbox

soniKKs GmbH
ULTRASONICS TECHNOLOGY

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Overview

The soniKKs Switchbox is a smart tool that will increase the capacities of your ultrasonic generators by allowing them to operate several transducers, one at a time of course.

As you can see on the back panel, the box features 3 input connectors and 10 output connectors, which makes it possible for up to 3 generators to control **up to 10 transducers**, depending on the configuration.

Front panel

Back panel

The three basic configurations (or modes) are directly drawn on the front panel.

They are the following:

- ✓ Mode 1: 1 generator with a pool of 10 transducers
- ✓ Mode 2: 2 generators with 2 separate pools of 4 and 6 transducers
- ✓ Mode 3: 3 generators with 3 separate pools of 4, 3 and 3 transducers

As for all our products, we tried to make it as easy-of-use as possible. Therefore, it can be operated locally with a **simple rotary encoder**.

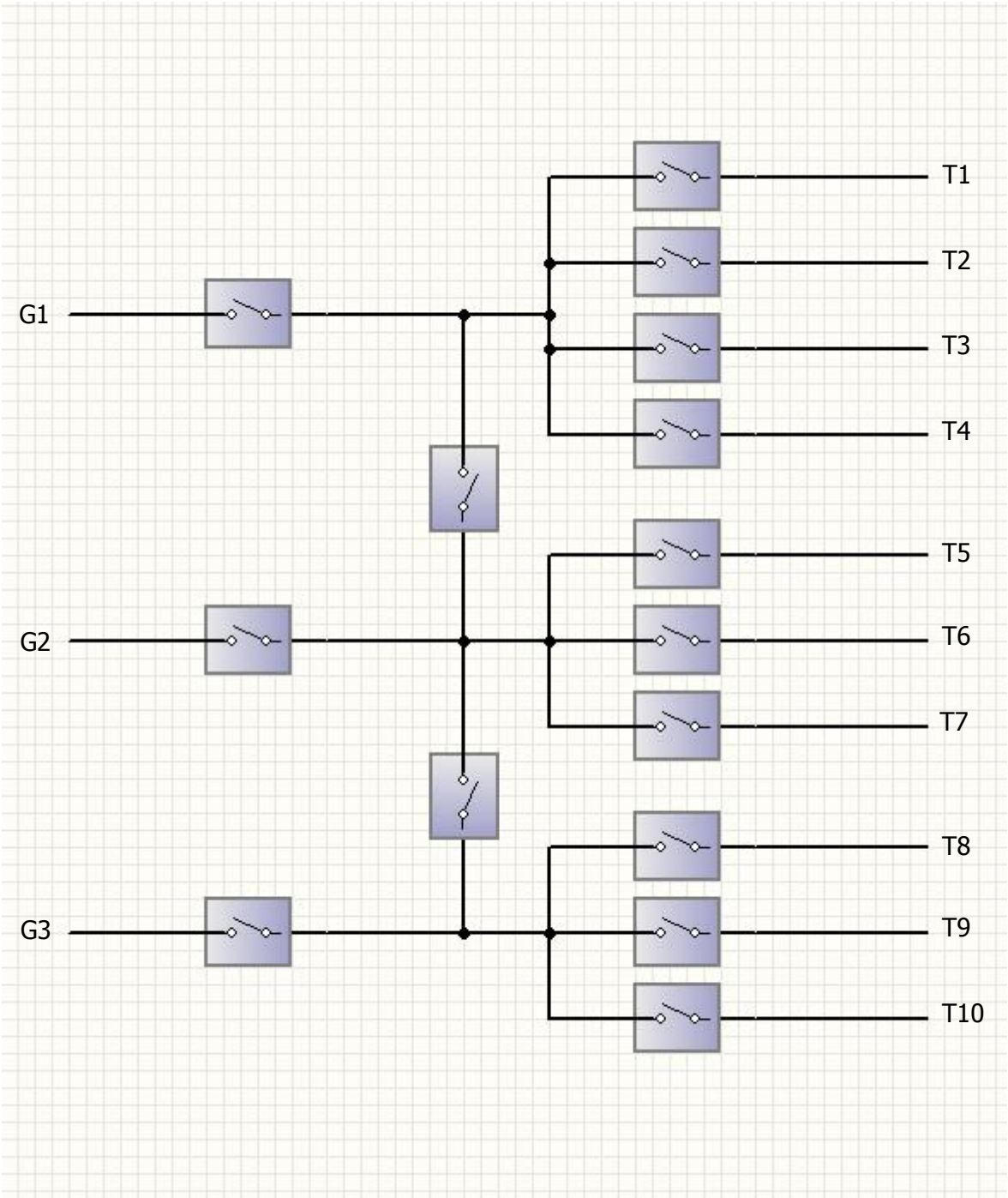
It can also be operated by a remote controller of yours, which allows you to create a custom cycle for your application, and thus automate your production chain.

On top of it, we designed our switchbox so, that **several switchboxes can be controlled independently with only one controller**. This will tremendously simplify your installation and save you the cost of additional controllers.

Your controller can be connected to the switchbox using the standard 15-pole D-SUB socket ("Interface" socket). The connection is optically isolated in order to avoid ground loops.

Schematics

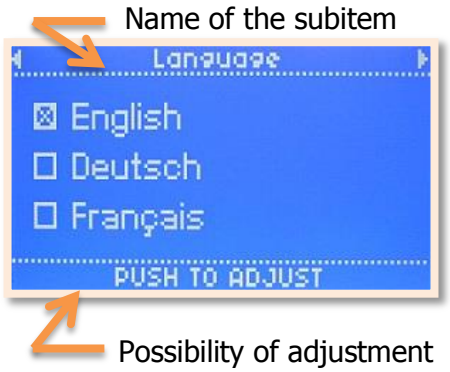
Here is a simplified drawing of the internal relays that connect the generators to the outputs.



Menu-items and operation

The generator is operated by a rotary encoder, which can be turned as well as pushed. This makes the operation very easy and uncomplicated.

The menu is structured in several subitems (see navigation chart). You can change items by turning the rotary encoder.



In the top of the display you can see the **name of the subitem.** In the bottom, you can see whether the screen only displays information or if **adjustments can be done** (see also color-code of the navigation chart). In this case, the bottom bar will display "PUSH TO ADJUST" (see picture on the right).

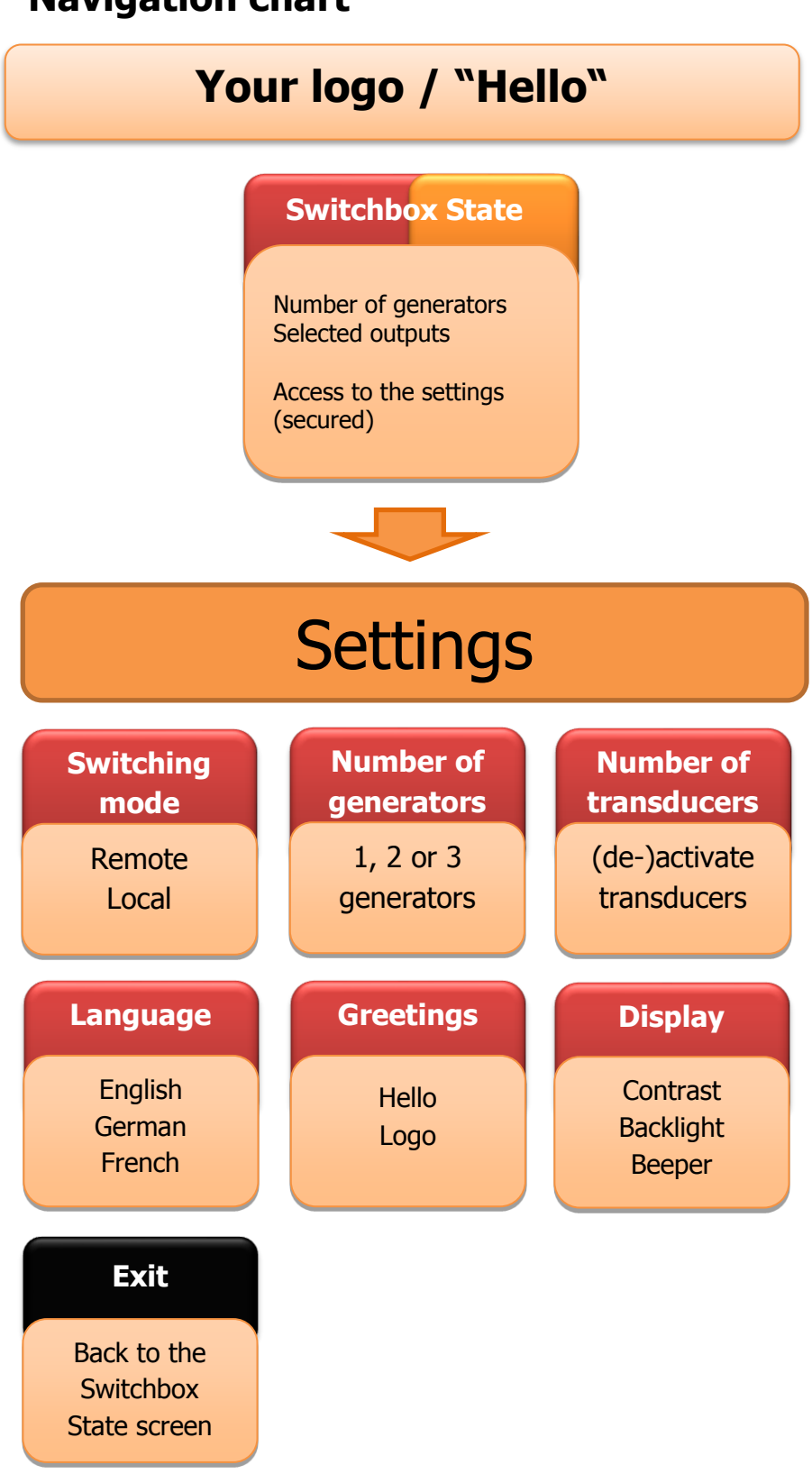
To modify a parameter, you must first enter the editing mode by pushing the rotary encoder as denoted in the bottom bar. At this point, one of the options will become highlighted, as well as the bottom bar. It makes it also very easy to distinguish the editing mode from normal "navigation" mode.

The adjustment of the values or the selection of the options is done by turning the rotary encoder. Pushing the rotary encoder a second time either brings you to the next parameter's adjustment or closes the editing mode if there is only one adjustable parameter in the screen, as it is the case for the language screen for instance.

Status LEDs

HF-1 – LED	ON: ultrasonic power detected on input 1
HF-2 – LED	ON: ultrasonic power detected on input 2
HF-3 – LED	ON: ultrasonic power detected on input 3
Busy - LED	ON: the switchbox is busy (relays are being switched, settings are being modified by the user) or not configured
Error - LED	ON: an error occurred
M1 - LED	ON: mode 1 is selected (1 generator)
M2 - LED	ON: mode 2 is selected (2 generators)
M3 - LED	ON: mode 3 is selected (3 generators)

Navigation chart



Caption

Transition

Display

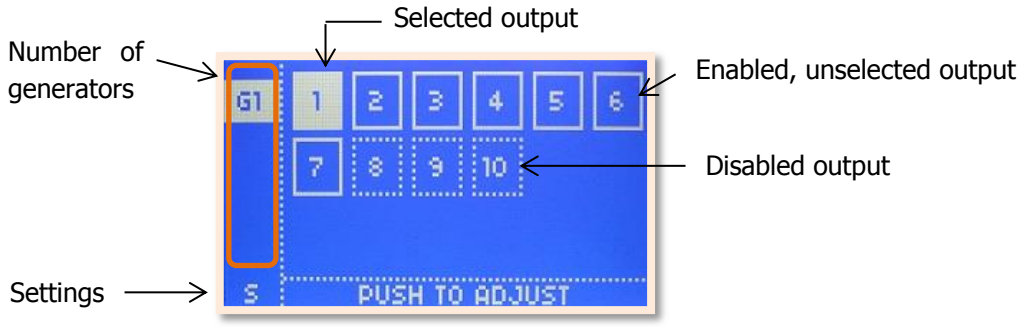
Adjustment is possible

Transducers are selectable in local mode only

Screens

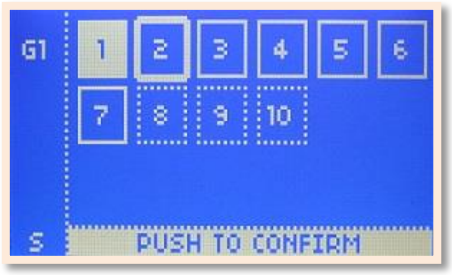
1. Switchbox State screen

This screen resumes all the information about the state of the switchbox.



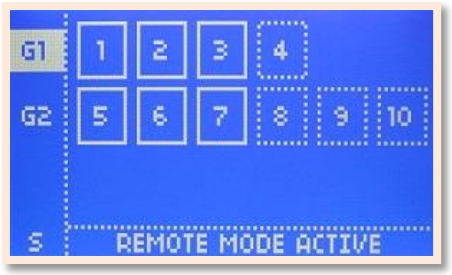
The number of generators is indicated with tabs in the left column, along with the settings tab. As you can see, this screen is slightly different from the others. Indeed, it has no navigation bar at the top. Instead, you can scroll through the different tabs by turning the encoder.

In local mode, you can enter the editing mode to select a new output by pushing the encoder (see picture on the right). The current selection is then made visible by a wider line. Once the output of your choice is selected, pressing the encoder again will apply the change.



In order for the switching to happen gracefully, make sure that no ultrasonic power is present on the concerned input during the whole switching process.

Please note that no local output switching is allowed in remote mode. In this case, the "REMOTE MODE ACTIVE" message will replace the "PUSH TO ADJUST" message in the bottom bar (picture on the right) and the editing mode will be unreachable.



In any case, you always have the possibility to enter the settings by selecting the "S" tab and entering the correct password (see the "Password" screen).

2. Password screen

This screen is the gateway to the settings screens, whose access is protected by a password.

As you can see, the password is a 5-digit long, numeric password.

When entering the screen, the first digit is already displayed and editable. Turn the encoder until you reach the desired number. Then, press the encoder to confirm and edit the next digit.

Repeat the same operation for all of the 5 numbers.

Please note that a wrong combination will lead you to an error message.

3. Settings screens

➢ SWITCHING MODE

This screen deals with the output switching mode. The switchbox can be operated locally or remotely. However, both modes cannot be active at the same time.

To modify this parameter, enter the editing mode by pushing the rotary encoder. Press it again once the option of your choice is selected.

➢ NUMBER OF GENERATORS

In this screen, you can select the number of generators that you want to use, and in consequence change the configuration mode.

Proceed as usual to modify this parameter.

Please note that the change will only be applied when you exit the settings.

Make sure that there is no ultrasonic power on any input of the switchbox before applying the change and during the whole switching process.

NUMBER OF TRANSDUCERS

In this screen, you can select the number of transducers that you want to enable.

In case you are in configuration mode 1 (1 generator), the only line displayed is the one of generator 1. De-activating outputs will make them no longer selectable. In remote mode, trying to select a disabled output will cause the "INVALID SELECTION" error message to appear.

Proceed as usual to modify this parameter.

As for the number of generators, please note that the change will only be applied when you exit the settings.

Make sure that there is no ultrasonic power on the inputs of the switchbox before applying the change and during the whole switching process.

LANGUAGE

Here you can choose the language in which the display contents are displayed.

Proceed as normal to activate the adjustment mode and change the settings.

ATTENTION: For your own safety, do not choose a language you do not understand. The language changes immediately by confirming your choice and the menu appears in the chosen language, which could be foreign to you.

GREETINGS

This screen allows you to choose what will be displayed on startup. You can either select to display the stored logo or a simple "Hello" message.

➢ DISPLAY

Here you can tune display-related parameters such as the contrast and the backlight. You can also activate/de-activate the beeper.

Push the rotary encoder to enter adjustment mode.

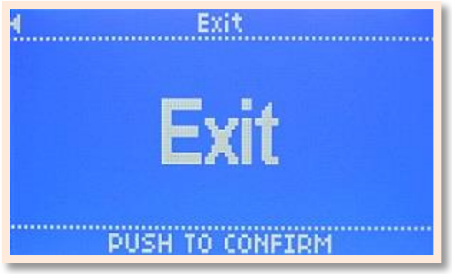
Select the desired contrast level by turning the encoder and push it to confirm the change.

Repeat the same operation for the backlight. As you will notice, you can choose between the three options below:

- ✓ On: the backlight is switched on permanently
- ✓ Auto: the backlight switches automatically off after a while if the generator is not used
- ✓ Dim: the backlight is dimmed to a low level

Push again to set the displayed option and go on to the beeper adjustment. Choose between "On" and "Off".

➢ EXIT



Pushing the rotary encoder makes you leave the settings and brings you back to the "Switchbox State" screen.

Operating the soniKKs switchbox

To get started with the soniKKs Switchbox, the first thing you need to determine is how many generators and transducers your application needs. Once you have this information, you can connect the different devices to the switchbox and configure it, before you can actually use it.

Here are the important settings to be configured:

- The switching mode (see the "Switching Mode" screen)
- The number of generators (see the "Number of generators" screen)
- The number of transducers (see the "Number of transducers screen)

1. Startup

Before powering the switchbox, please make sure that the main power supply has the following characteristics:

Main supply voltage: 230V~ 50/60Hz ±10%

On startup, the switchbox will configure itself with the last memorized configuration. Note that each time you set a new configuration, it overwrites the previous one in the memory. The storage only occurs once the configuration is applied.

Thus, **no ultrasonic power should be present on the switchbox's inputs during startup**. Otherwise, the switchbox will issue an error and the initial configuration will be put on standby. It will only be applied once every input is clear.

2. Configuring the switchbox

First, note that the configuration of the switchbox **can only be done locally**. That is to say, your remote controller cannot change the number of generators for instance. You have to do it using the rotary encoder.

Also, the configuration process puts the switchbox into a **busy state**, which makes it impossible for a remote controller to switch outputs at the same time.

The configuration process starts upon entering the settings and ends when the switchings have been **successfully** done. All switch commands received in between will generate an error message.

Configuring the switchbox is really easy since the settings screens come in a logical order.

1.

2.

3.

Once these parameters have been set, go to the "Exit" screen to leave the settings and actually apply the changes. The configuration is then stored in the memory in order to be reloaded at the next startup.

In order for the configuration to succeed, make sure that there is no ultrasonic power on any input of the switchbox before applying the change and during the whole switching process.

If the configuration fails, the switchbox will lose its previous state and will prompt you to try and exit the settings again.

3. Local output switching

Once the switchbox is configured, with the local mode selected, you can switch outputs from the "Switch State" screen as described in the screen's description.

Turn the rotary encoder to select a generator and push it to modify its active output.

Just make sure that no ultrasonic power comes on the concerned input during the whole switching process.

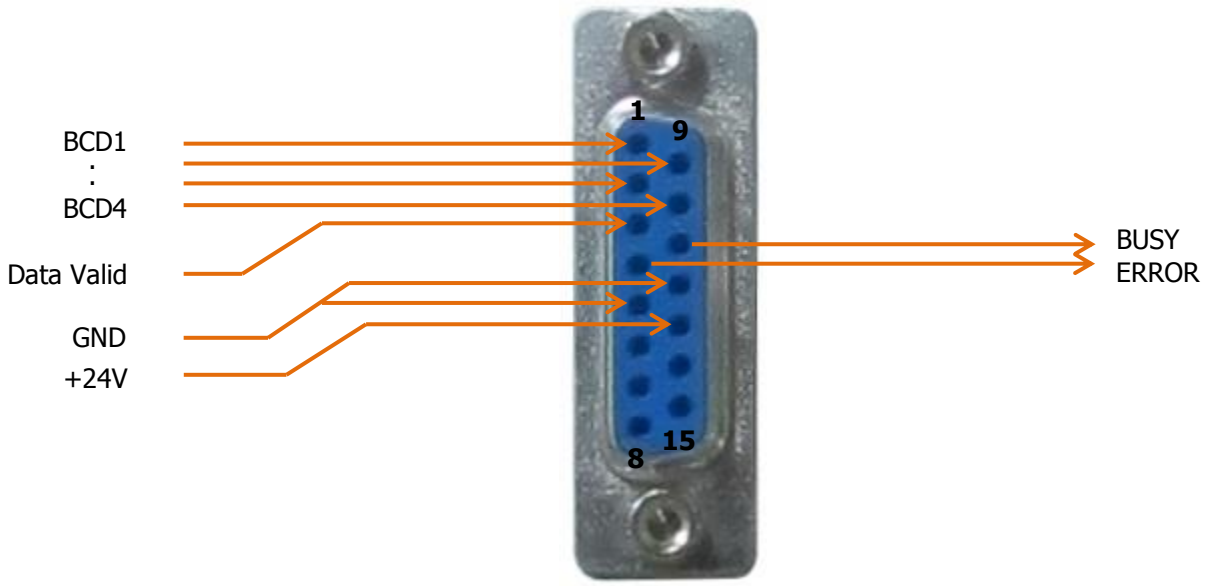
Note that the inputs are independent from each other. This means that you can switch one generators' active output while ultrasonic power is present on an other input.

4. Remote Operation mode

1.4.1 Interface

The connection between your controller and the switchbox can be made via the 15-pole D-SUB socket located on the back panel.

The different signals coming to and from the switchbox are the following:



Pin	Name	I/O	Logic Level	Description
1	BCD 1	Input	L: 0V / H: 24V	Binary coded instruction for transducer selection (LSB)
2	BCD 3	Input	L: 0V / H: 24V	Binary coded instruction for transducer selection
3	Data Valid	Input	L: 0V / H: 24V	Switch trigger (apply the BCD instruction)
4	Error	Output	L: 0V / H: 24V	Error output signal
5	GND	Input	-	Ground reference from the controller
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	BCD 2	Input	L: 0V / H: 24V	Binary coded instruction for transducer selection
10	BCD 4	Input	L: 0V / H: 24V	Binary coded instruction for transducer selection (MSB)
11	Busy	Output	L: 0V / H: 24V	Busy output signal
12	GND	Input	-	Ground reference from the controller
13	+24V	Input	24V – 100mA	Supply voltage from the controller
14	-	-	-	-
15	-	-	-	-

1.4.2 Remote output switching

Assuming that you have properly set the "Switching Mode" parameter, here is the procedure to follow in order to perform a remote output switching.

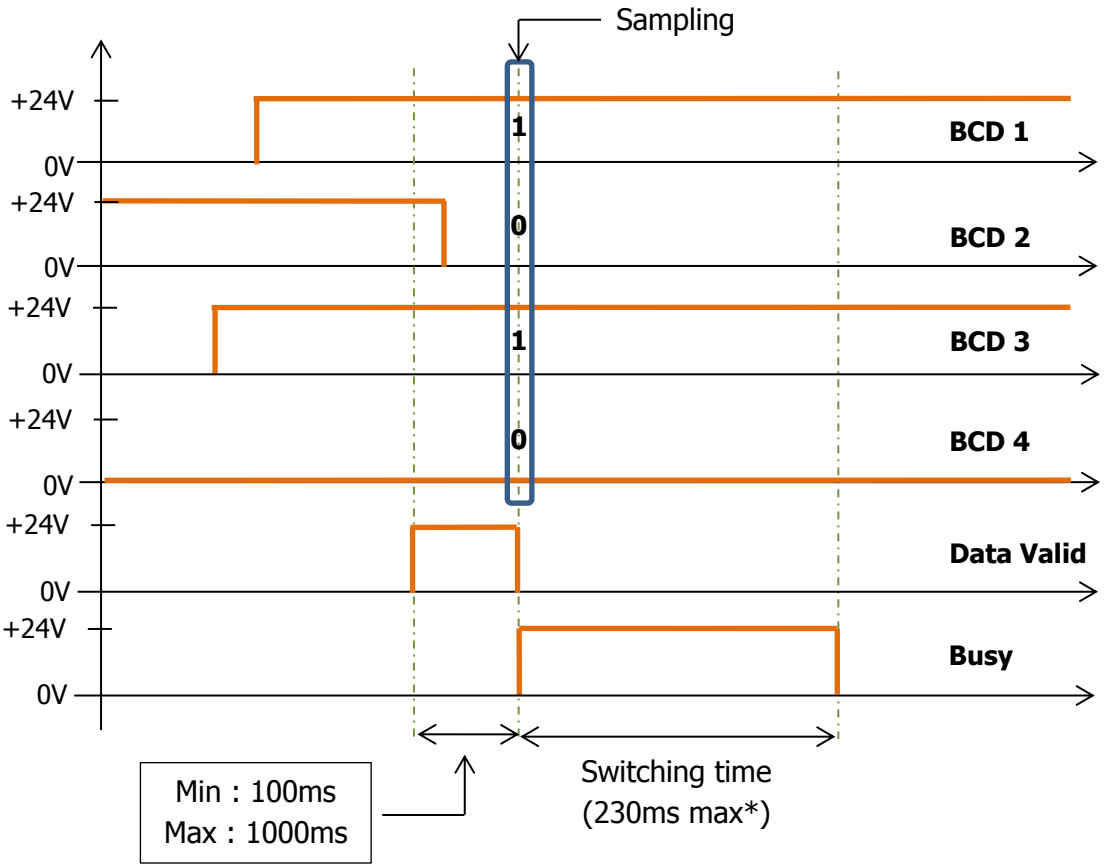
1. Set the BCD inputs so that they correspond to the transducer that you want to select (refer to the command table).

2. Make sure that no ultrasonic power is present on the input. Otherwise, stop the generator and **wait at least 200ms** before switching, in order for the power to fade completely.

3. Generate a pulse on the Data Valid line to trigger the switching. **This pulse should last between 100ms and 1000ms, otherwise the command will simply be ignored**. The BCD inputs are sampled at the end of the pulse. Thus, make sure that these signals are stable until then.

4. Poll the busy line and wait until it goes low before starting the generator again.

❖ **Timing chart**



* the switching time is longer than 230ms for a configuration switching (i.e. changing the number of generators). For an output switching, it is rarely more than 220ms.

❖ **Command set**

Command (decimal / binary)	Config. Mode 1	Config. Mode 2	Config. Mode 3
0 / 0000	G1-TR1	G1-TR1	G1-TR1
1 / 0001	G1-TR2	G1-TR2	G1-TR2
2 / 0010	G1-TR3	G1-TR3	G1-TR3
3 / 0011	G1-TR4	G1-TR4	G1-TR4
4 / 0100	G1-TR5	G2-TR5	G2-TR5
5 / 0101	G1-TR6	G2-TR6	G2-TR6
6 / 0110	G1-TR7	G2-TR7	G2-TR7
7 / 0111	G1-TR8	G2-TR8	-
8 / 1000	G1-TR9	G2-TR9	G3-TR8
9 / 1001	G1-TR10	G2-TR10	G3-TR9
10 / 1010	-	-	G3-TR10
11 / 1011	-	-	-
12 / 1100	-	-	-
13 / 1101	-	-	-
14 / 1110	-	-	-
15 / 1111	-	-	-

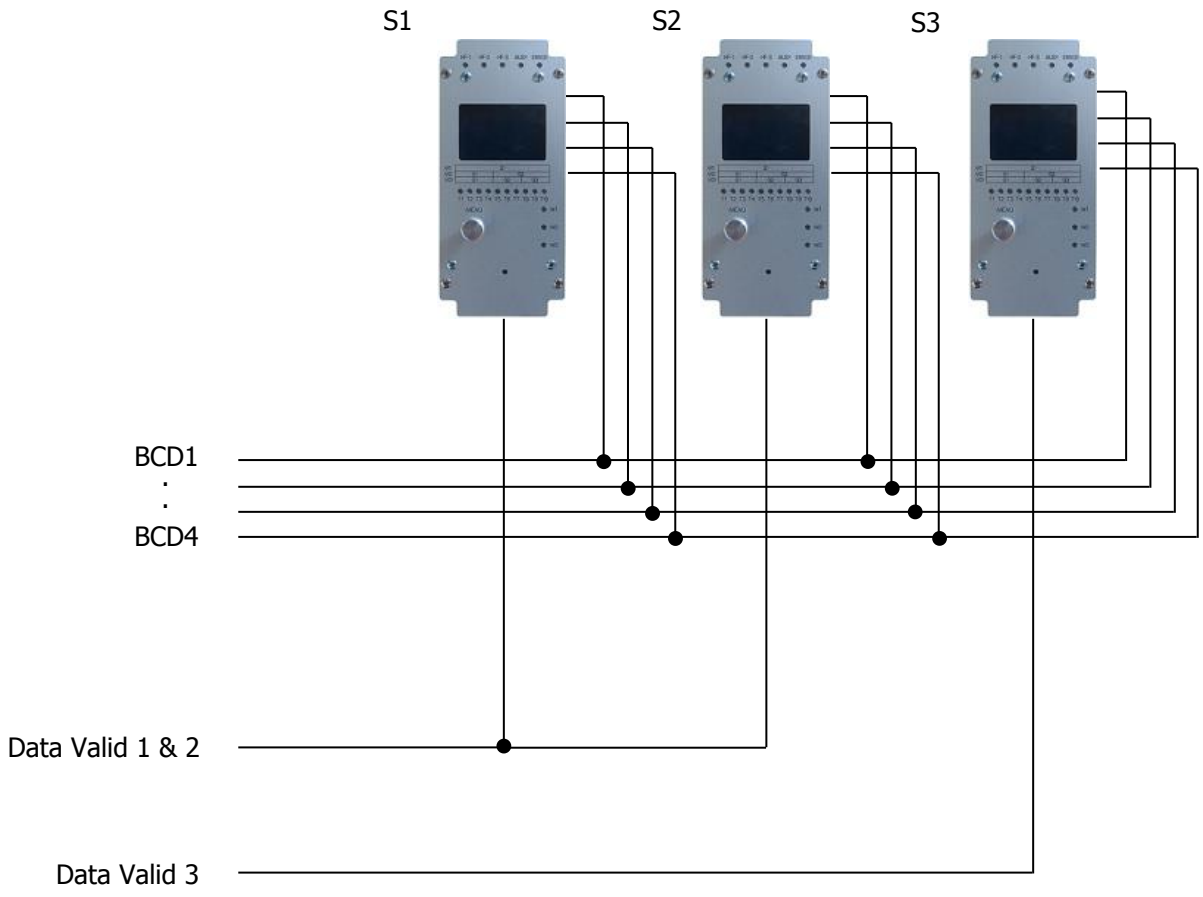
As you can see in the table above, some commands have no effect. Sending such a command to the switchbox will result in an error status. The switchbox will then display "INVALID SELECTION" (see Error Messages).

5. Connecting several switchboxes in parallel

In remote mode, soniKKs switchboxes offer you the possibility to operate several of them with only one controller. In order to do so, you need to set up the following lines between your controller and the switchboxes:

- 1 BCD bus (of 4 lines)
- Several selection lines ("Data Valid" lines), depending on your application.

Example: you are using 3 switchboxes. You want switchboxes no. 1 and 2 to behave the same way (i.e. to switch identically) and switchbox no. 3 to be controlled independently. You will then need 1 common "Data valid" line for no. 1, 2 and 1 additional line for no. 3.



NB: In most cases, you might want to switch your switchboxes independently, in which case each one of them should have its own Data valid line.

Error messages

Error message	Explanation
	➢ Your controller sent an invalid command to the switchbox. Refer to the command table to fix this problem.
	➢ Ultrasonic power came up on an input while the switchbox was switching. In this case the switchbox stops in the current state to prevent any damage. In most cases, the switching has to be done again.
	➢ Ultrasonic power was detected on an unexpected input. That is to say, the current configuration of the switchbox is inappropriate OR a generator is connected on the wrong input.
	➢ The switchbox can not switch under ultrasonic load. Turn off the concerned generators and repeat the switch.
	➢ The controller sent a switch command while a configuration process was ongoing (and the switchbox was busy). An output switching is only allowed when the switchbox is NOT busy.

- Ultrasonic power was detected on an input that has no transducer selected.

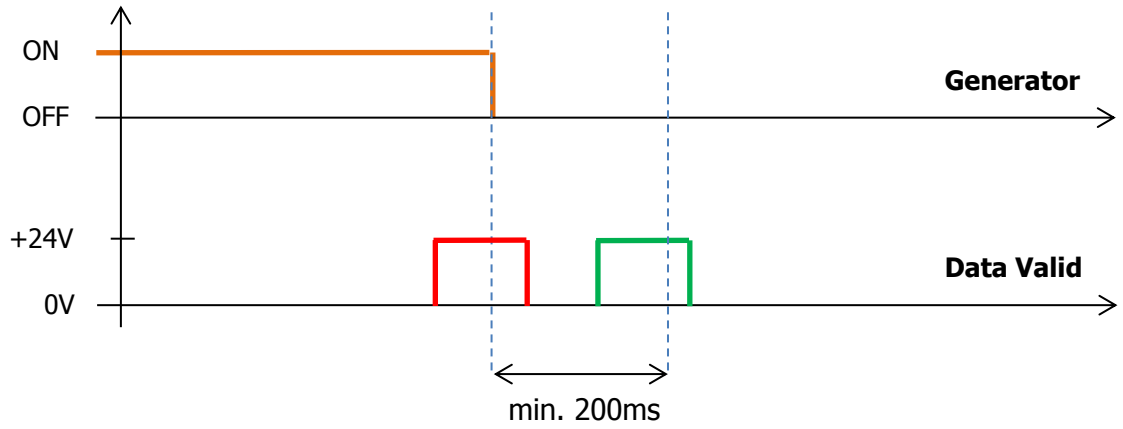
Change history

❖ **Revision 1.0.112.3190**

An additional security mechanism has been added to protect the relays. It prevents the user from switching during a 200ms-lapse of time after turning off the generator.

Indeed, the power does not immediately stop coming through the switchbox. Instead, it slowly decreases to zero. According to our measurements, the time needed for that residual power to completely fade is about 200ms. Only after this time can we guarantee that the relays will not be damaged.

In the timing chart below, the red pattern shows a wrong manipulation, while the green pattern depicts a possible one. Note that the switch command is only acknowledged with the falling edge of the pulse. In the correct pattern, the falling edge occurs after the 200ms security time.



Note that the wrong manipulation (red pattern) will cause an error message to occur and the switch command will be ignored.

Maintenance and care

There is no need for special maintenance! Please remove any dust and dirt with a damp woven fabric. Do not use any chemicals to clean the device. Keep the cooling slots clear all time.

Warranty

The period and extent of the warranty is part of the commercial terms and conditions. Special agreements are part of the confirmation of the order.

The warranty does not cover malfunctions, injuries and damages that result from misuse, unauthorized modifications, and external causes such as acts of nature.

Warranty exclusion applies in the following cases:

- Damage due to wrong handling or tampering
- Damage due to wrong application
- Damage due to shock, dirt or moisture
- Damage due to operation by non-qualified staff
- Damage due to nonobservance of safety regulations or accident prevention regulations
- Damage due to modifications to the operating manual

Declaration of CE Conformity

For:	**RF - SWITCHBOX**
Model:	**HFU-D-310**
Manufacturer:	**soniKKs Ultrasonics Technology GmbH"**
Manufacturer's Address:	**Neuenbürgerstrasse 72** **Dobel,** **GERMANY**

We, the manufacturer "soniKKs Ultrasonic technology GmbH" declare in our sole responsibility that the upper mentioned RF - Switchbox corresponds

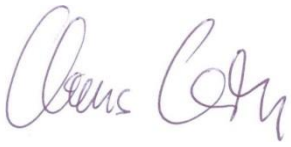
to the following EEC directives:

EN 50081-1
EN 50082-2
EN 55022
EN 55014
EN 6055
EN 61000

The device complies with ESSENTIAL SAFETY REQUIREMENTS of EU COUNCIL DIRECTIVE Of 2006/42/EC and 2006/95/EC applied codes and standards.

ATTENTION: The device is not designed to be connected to the public utility (AC) power line! Unauthorized modification of the device makes this declaration void.

Dobel, 01.09.2013



Klaus Kern
Managing Director

Imprint

Purpose and use

The operating manual explains the handling and operation of the display and the firmware in connection with standard accessories for use in laboratories and the industry.

Please read especially the safety instructions carefully and observe them all.

The operating manual should always be at hand to help you solve any questions or problems that may arise.

All rights reserved

This manual has been prepared with all due care, nevertheless faults and omissions cannot be fully precluded.

soniKKs GmbH reserves the right to make changes to the technical data and specifications during the course of further development of the product without given prior notice.

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Editing

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